SIEMENS

MAMMOMAT 1000/3000 Nova

SP

Installation

Installation Instructions

AEC Correction tables for AGFA CR Embrace

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These instructions describe how to Install the AEC (Automatic Exposure Control) Correction Tables, prepared specifically for the Computed Radiography Image Plate Cassette Reader AGFA CR Embrace on a MAMMOMAT 1000/3000/3000Nova, and how to perform the calibration of the AEC device after such an installation.

The Computed Radiography image plate cassette reader system >AGFA CR Embrace< consists of:
> one (1) cassette reader unit, performing the read operation (also called "reader" or "digitizer")

> one (1) personal computer (PC) equipped usually with Windows NT operating system (OS)

> one (1) TFT monitor

> one (1) mouse

> one (1) keyboard

> one (1) identification station, (sometimes called "ID-station", "ID-viewer" or "writer") into which the cassettes have to be inserted before the read operation; the cassettes are equipped with special integrated circuits (chips).

The cassettes to be used are of the type: CR MM 2.0, and they contain the image plate of the same name. The cassettes have to be used with the text/script being on the top side. The alphanumerical code may signify the production batch number.

The reader system allows for two different applications:

The patient identification (ID) application can be:

> Start ADC QS

Username:

Password:

(for these data the personnel of AGFA has to be approached and asked.)

> Start ADC QS ID

Username:

Password:

(for these data the personnel of AGFA, or of the hospital / clinic can be approached and asked.)

For the read operation application usually no username and password will be necessary.

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Safety information

When carrying out the work steps and the tests, the product-specific safety information contained in this document, as well as the general safety information must be observed.

Components included

The kit "AEC Correction tables for AGFA CR Embrace"(Siemens Sales No. 144 00 989, Siemens material No. 100 93 394), applicable for MAMMOMAT 1000/3000/3000Nova, includes:

Quantity	Material No.	Name
1	086 46 494	AEC Correction tables for AGFA CR Embrace
1	SPB7-230.812.07	This document
2	060 01 486	Floppy disk (empty, for backup purposes)
1	034 34 008	IVK-Label (w/o CE), 37 x 74 mm

Tools, meters and appliances required

- Standard installation tool kit.
- Service PC
- Operating system Windows2000.
- Connecting cable (PC - Generator), material No. 99 00 440 RE999.
- AEC calibration plexi: Three plates, 2 cm (material No. 65 61 232) One plate 1 cm (material No. 65 61 224)
- Ionization chamber and electrometer calibrated at the mammography x-ray beam energies thin enough to be placed in cassette compartment (material No. 97 17 612 or equivalent).

Documents required

The technical documentation originally supplied with the MAMMOMAT.

Time required

The installation of the AEC correction tables for AGFA CR Embrace on a Mammomat - already working normally with its AEC adjusted for other purpose - will need approximately seven (**7**) hours for one Customer Support Engineer.

If the CSE isn't familiar well with the AGFA CR Embrace, he may need to contact AGFA personnel for support. It is recommended that the CSE should have the necessary phone numbers, addresses, etc. of AGFA company along with him, when he starts this work.

When the CSE isn't familiar with the operation of AGFA CR Embrace IP reader at all, the assistance of AGFA support at site will be necessary.

In some geographical areas (e.g. on the territory of the Federal Republic of Germany, or in the USA...) Rules and Regulations may prescribe the execution of partial acceptance test and (partial) constancy tests after such an essential change in the characteristics of the AEC. These activities may need an additional time estimated at around seven (**7**) hours for one CSE, or for a medical physicist.

Especially for constancy test it is recommended that the technical personnel from AGFA should be present. This will help to avoid the possibility that the customer will have to initiate the implementation of such measurements and tests twice. Authorized expert from a notified body may need to be present for such tests, as well.

Prerequisites

MAMMOMAT

1. The installation of the Siemens MAMMOMAT must be completed.
2. For MAMMOMAT 3000 Nova with serial No. lower than 6850, upgrade with the "Extended radiation field kit" material No. 64 83 551 must be completed.
3. For MAMMOMAT 3000 with serial No. lower than 7000, upgrade with the "AEC upgrade kit" No. 65 52 819 must be completed.

As of June 2005 the "AEC upgrade kit, material No. 65 52 819 contains the firmware "Stand PROM V4.5", the firmware "Generator and control panel PROM V4.5", the "Dose calculation program V1.0" and the "Service program V4.4". (Further development may follow.)

Those FW versions are the same as in the >>PROM kit No. 66 24 410<<. As a spare part for the firmware V4.5 and the service software V4.4, the spare part kit material number 65 76 420 was provided. (As of the serial number 7000 and higher the logo Nova was added to the name MAMMOMAT 1000/3000, pointing to the fact that these Mammomat units are being delivered already with the "new" AEC.)

Prerequisites for the installation kit no. 65 52 819: Depending on the serial number and/or version of the software of the MAMMOMAT in question, complementary measures may have to be taken. These measures are described below.

- For MAMMOMAT 1000/3000 with serial number lower than 2056:

  If not done previously; change the polarity of the stereo lever switch.
- For MAMMOMAT 1000/3000 with serial number lower than 3242:

  Make sure that the article no. of the PC board D702 is 64 21 288.
- For MAMMOMAT 1000/3000 software version lower than v1.5:

  Replace HSE detectors. The part no. of the HSE detectors must be 38 47 626.
- For MAMMOMAT 1000/3000 software version lower than v2.2:

  Calibrate the swivel-arm rotation.

NOTICE

The tables for AGFA CR Embrace imaging plate and cassette will be installed on D and will overwrite existing tables.

Therefore, make sure that the correction tables for the film/screen combination are installed on H.

If more than one film/screen combination has been installed, one of them has to be removed.

AGFA equipment

AGFA .CR 75.0 Digitizer and AGFA ADC QS work Station with ID-station

Abbreviations

CR = Computed Radiography

IVK = Installed Volume Component

IP = Imaging Plate

- Patient registration. Enter patient information in the ID-viewer window in the ADC QS work station see Fig. 1, Page 3 - 1. Filling the fields: Sex, Srudy group and Study type is mandatory. The system itself will set an ID number (identification number). For other settings see below
  Fill in:
  Name: Any
  First Name: Any
  Patient ID: Any
  Date of birth: Any
  Sex: Other
  Study group: System Diagnostic
  Study type: Flat Field

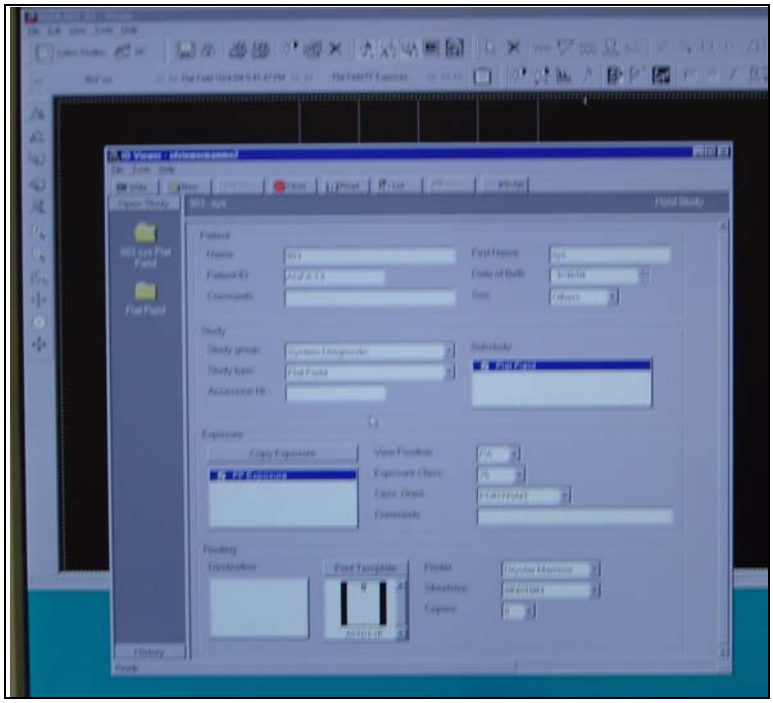


Fig. 1 ID Viewer

Selections to be made on the ID-viewer: (some already given above)

Viewing position (Betrachtungsposition): PA
Exposure class (Belichtungsklasse): 75
Cassette alignment (Kassettenausrichtung): Portrait
Study group / Examination class (Untersuchungsgruppe): System Diagnostics
Study type / Examination type (Untersuchungstyp): Flat Field

- Insert the IP cassette in to the ID-station and click on the **Write** button in the window ID Viewer. Wait until the message: **Remove cassette** appears. Having finished the IDS, continue with the other application.

- Insert the IP cassette in the object table according to Fig. 2, Page 3 - 2. (Use a suitable breast phantom or PMMA / plexi.)

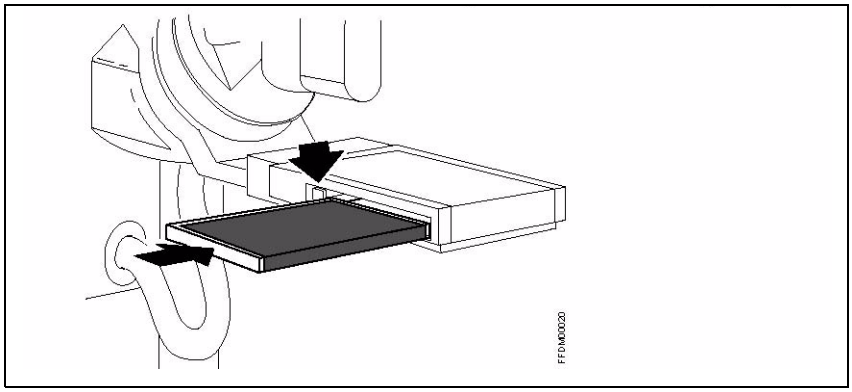


Fig. 2 Insertion of IP cassette

- Make an exposure with the MAMMOMAT.
- Unload the IP cassette from the object table and insert it in the AGFA digitizer (reader). **Initiate the readout of the IP cassette immediately, latest two (2) minutes after exposure was performed, otherwise results may be negatively affected.**
- To view the digitized image open window AGFA ADC QS: **Viewer**. Click on the button "**Select Studies**". See Fig. 3, Page 3 - 2. The AGFA ADC QS: **Selector** window will appear. See Fig. 4, Page 3 - 3.

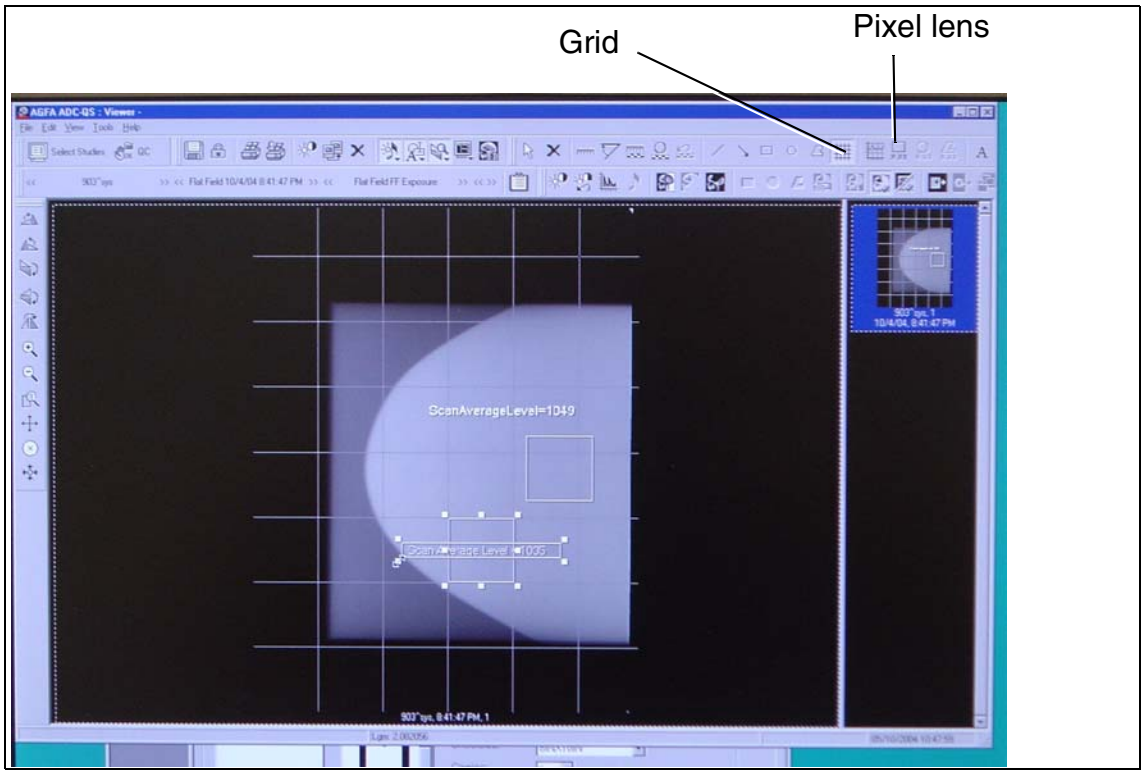


Fig. 3 AGFA ADC QS: Viewer

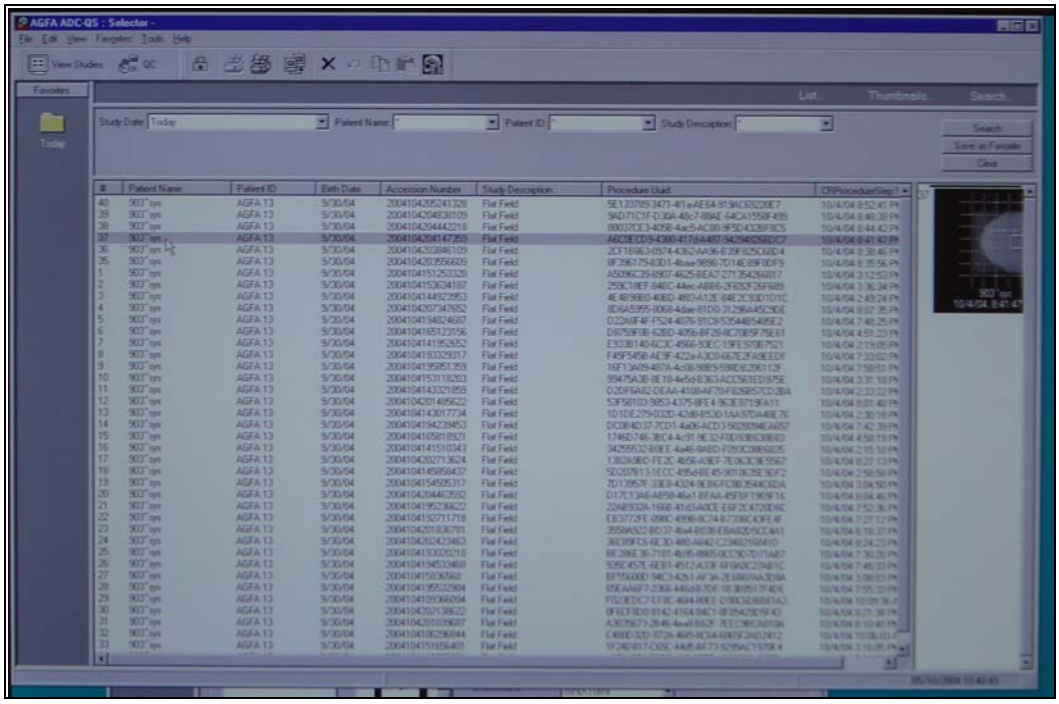


Fig. 4 AGFA ADC QS: Selector

- Select an image in the list and double click on the row. The AGFA ADC QS: **Viewer** window will appear with the selected image. See Fig. 3, Page 3 - 2.
- With the tool/button **Pixel lens** the average Pixel value (**PV**) can be read in a Region of Interest (ROI). It is recommended to select the ROI as a square field, size 3 x 3 cm, approximately 2 cm from the thoracic edge, and in the centre of the cassette. Click on the button **Pixel lens** (see Fig 3) and mark the ROI. The pixel value will appear in the text bar/frame, the text being: Scan average level: wxyz.; (the values will be at around 1000). If the text is too small it can be magnified by dragging the handle of the text bar/frame. The target value of the PV for the calibration and adjustment is **1040**. This would approximately correspond to an average optical density (OD) of 1,5, with a tolerance range of +/- 0,15.
- A grid can be displayed by clicking on the **Grid** button. A window for sizing the grid will appear first.
- A cassette can be erased by inserting it in the ID-station. Go to the **Tool** menu in the ID-viewer window first and select **Erase cassette**. Then insert the cassette in the digitizer.

Some remarks to the work with (hard copy) printers:

When printing hard copies make sure that the size of the hard copy image actually printed is exactly identical to the size of the image shown on monitor. If printed hard copy appears cut, or incomplete, change corresponding settings. In order to achieve this select the image to be printed, press **Print**, in the **Print preview**, then select **Hard copy format** (either 18x24, or 24x30), move the cursor into the image area and right-click within, then select **Optimal size** instead of the **Actual size** in the appearing menu.

Printing of images with a blackening / optical density of circa 1,6.

Go to the viewer monitor, click on **Histogram** (Window x.xx, Level x.xx), click on **Adjust Window / Level**. When in there, adjust and set following values: Window = **1,30**; Level ~ between **1,75** and **1,95**; then initiate a printout and measure the actual blackening / optical density.

General

These instructions describe an installation of the AEC floppy disk with the material No. 086 46 494 on the MAMMOMAT. This floppy disk makes the AEC correction tables (also called "Look-up"-tables) available for AGFA CR Embrace imaging plate cassettes (IP-cassettes).

The AEC is based on correction tables. The tables are optimized for the Imaging Plate (IP) itself and for the cassette. The actual combinations is given in table 1, Page 4 - 1.

Table 1				**Correction table identifications**		
Scanner	**IP**	**Cassette**	**Sensitivity**	**Mo/Mo**	**Mo/Rh**	**W/Rh**
AGFA CR 75.0 Digitizer	AGFA CR Embrace	AGFA CR Embrace	0	1501	1502	1503

Definitions

Old backup floppy disk	Backup floppy disk to store data from before the installation. To be marked “Old backup” and with serial No. of the MAMMOMAT system, date, and version of the correction tables.
New backup floppy disk	Backup floppy disk to store data during and after the installation. To be marked “New backup” and with serial No. of the MAMMOMAT system, date, and version of the correction tables.
PV	Pixel Value from flat field image

Protective measures

It is very important that any intervention in the MAMMOMAT equipment will start by disconnecting it from the power supply by means of the main circuit-breaker.

⚠WARNING

If the system is only switched off at the control panel or with S2/ D711, line voltage will still be present at the generator line connection, line filter Z1, Z2, transformer T1, transformer T10 and PC board D711 (see MAMMOMAT 1000/3000 Nova Wiring Diagram).

Life-threatening electric shock hazard exists.

Disconnect mains cable and comply with the information on this page.

⚠WARNING

After shut-down of the system, there may still be 380 V DC present on the intermediate circuit.

Life-threatening electric shock hazard exists.

The voltage level will be indicated by LED V24 on PC board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V

Symbols

Checks and adjustments that must be performed with radiation ON are identified by the radiation warning symbol.

Delay times between two exposures

Delay times listed below must be followed in order to prevent the tube from overheating.

Exposure mAs value	Delay time between two exposures (seconds)
max 100	min 15
max 200	min 30
max 300	min 45
max 400	min 60
max 500	min 75

Preparation of backup floppy

1. Start service PC.
2. Log in (make sure you have administrator rights).
3. Open Windows Explorer.
4. Create a new folder under C: and name it “AEC_inst”.
5. Insert the service program floppy in drive A:.
6. Copy the files service.exe and m300.h60 from A: to C:\AEC_inst.
7. Insert the floppy AEC correction tables in drive A:.
8. Copy all files from A: to C:\AEC_inst.
9. Mark an empty backup floppy with **new backup**, serial number of the MAMMOMAT system, version of the correction tables, and date. Insert the floppy in drive A.
10. Copy the content of C:\AEC_inst to A:. Use this floppy for the rest of the installation.
11. Press Start and select Programs > Accessories > Command Prompt.
12. In the DOS prompt, type:
“CD \” and press Enter,
“MKDIR mammomat” and press Enter,
“CD mammomat” and press Enter,
“A:” and press Enter.
13. If AEC correction tables have been installed on the MAMMOMAT before, make a backup of these tables, see "Backup of existing system" 4, Page 4 - 4.
14. Start the service program by running the service.exe file from A:.

Backup of existing system

1. Make sure that the service floppy is still in drive A:.
2. Start the service program by writing: Service, then press Enter.
3. - In the log in-menu, enter your name and press Enter.
- Type the password for the service program and press Enter.
- In Program-mode set: **normal**.
4. Check that service program version 4.3 or higher is used. The version is shown in the top left corner of the display.
5. In **Mainmenu** select **Configuration > Power**. Note the displayed power values in the test protocol on Page x - 1.
6. Take the backup to hard disk: **Backup > Copy installation area to disk > All**.
7. Take out the floppy with the service program and insert an empty floppy disk and mark it with ***old backup***, serial number of system, version of the correction tables, and date. This floppy is defined as ***old backup floppy***.
8. In **Mainmenu** select **Configuration > Save config file**. Press F2 to save.
9. In **Mainmenu** select **Service > Copy error buffer to file**.

10. If the MAMMOMAT is equipped with OPDOSE, press the left program button on the control panel. Note the displayed exposure settings in the test protocol on Page 6 - 1 (Customer's own OPDOSE settings). Repeat for all four programs. Enter menu **Configuration > Miscellaneous > Auto limits**. Note the three values in test protocol on Page 6 - 1, in column "Breast thickness".
11. Quit the service program by pressing F10.
12. Type "C:" and press Enter.
13. Type "COPY *.TXT A:" and press Enter.
14. Check that the following backup files are stored on the floppy disk (by typing "dir a:", then pressing Enter):
    - a_backup.txt for AEC parameters
    - s_backup.txt for stand parameters
    - p_backup.txt for panel parameters
    - momo_h.txt for AEC correction tables
    - morh_h.txt for AEC correction tables
    - wrh_h.txt for AEC correction tables
    - momo_d.txt for AEC correction tables
    - morh_d.txt for AEC correction tables
    - wrh_d.txt for AEC correction tables
    - mammo.cfg for configuration parameters
    - errorbuf.txt for error log
15. Type "DEL *.TXT" and press Enter.
16. Remove the floppy disk and make it write protected.
17. Insert the ***new backup floppy*** in drive A:.
18. Start the service program by running the service.exe file from A:.

Definitions

Object table group

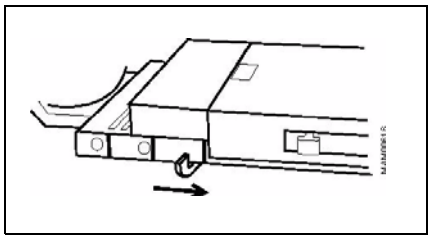
An object table group contains all object tables of the same type. There are four groups of object tables - Grid, No grid, Magnification and Stereo. For example the object table group Grid, consists of Grid tables sized: 18x24 cm and 24x30 cm.

NOTE	**Stereo shall not be used together with AGFA CR Embrace.**

General conditions

When performing the settings in this chapter, there are some general conditions valid for all settings:

- The AEC detector has to be in chest wall position.



- The AEC calibration plexi (material No. 65 61 224 and 65 61 232) must extend at least 10 mm beyond the chest wall edge of the table and it must be centered. Place the AEC calibration plexi in the same position for all exposures.

Calibration conditions

Compression plate **must not** be used during the calibration of correction tables. From the point **Sensitivity correction** (fine setting) onward a compression plate may be used.

Reference IP cassette

Every **AGFA CR Embrace** system should have a reference IP cassette, and it should be properly marked as such. Use this reference IP cassette where required and for the settings in this chapter. If there is no dedicated reference IP cassette at site, pick one IP cassette, mark it and use it for the settings in this chapter.

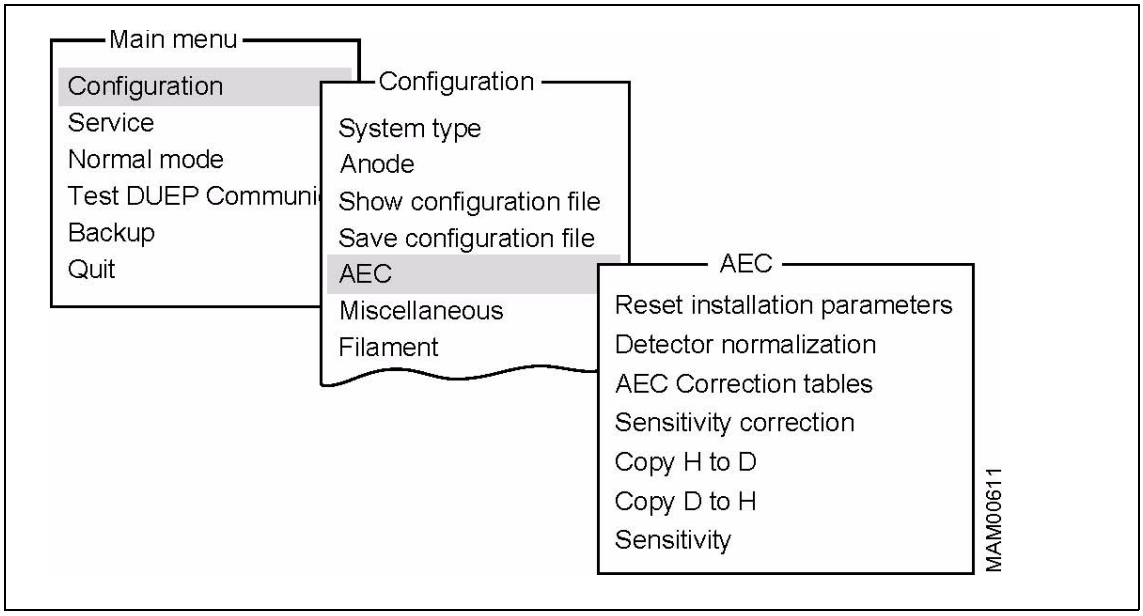
Mains voltage

Unless otherwise stated, the mains voltage and system must be ON and the service program running, before performing any setting in this chapter.

Sensitivity conditions

- One step (1/8 E.P.) corresponds to approximately 20 PV (pixel value points.)

Overview of work routine



There are three (3) main tasks, as follows:

1. "AEC Correction tables" on the Page **4 - 9**.
2. "Sensitivity correction (fine setting)" on the Page **4 - 17.**
3. "Sensitivity" on the Page **4 - 19.**

NOTE	**Always initiate the readout of the Image Plate cassette soon after the exposure was performed, within about 2 minutes, at the latest. Results may be negatively affected if delay was longer. Observe pertaining instructions from AGFA!**

DLF switch off

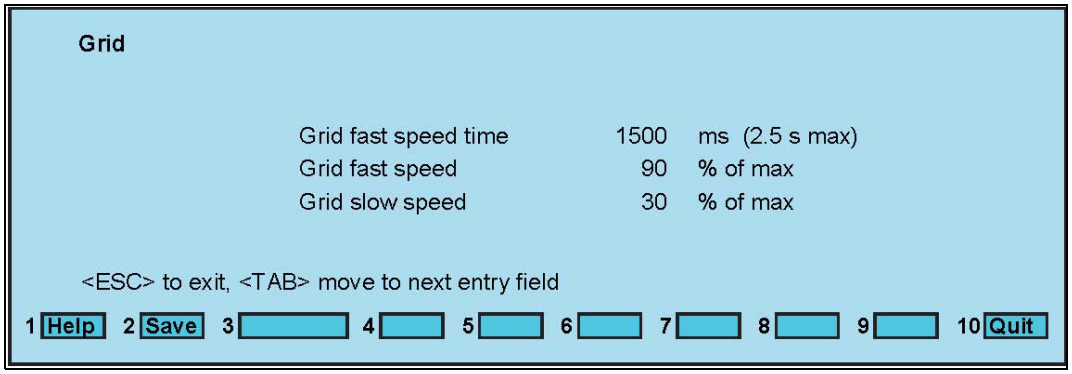
Deactivate the DLF switch. In Main menu select **Configuration > Miscellaneous > DLF switch.** Press the **space bar** to set switch to OFF. Press **F2** to save.

Cassette loaded

In **Mainmenu** select **Configuration > Miscellaneous > Cassette loaded check**. Press the **space bar** to set switch to OFF. Press **F2** to save.

Increase grid speed

Increase the grid speed. In **Main menu** select **Configuration > Grid speed**. Set the values as shown in the table just below. Press **F2** to save.
(For the reduction of the grid speed after all the work is done, see under the corresponding point >>Reduce grid speed<< under Paragraph Final Procedures on the page 4 - 24.)


Grid
Grid fast speed time 1500 ms (2.5 s max)
Grid fast speed 90 % of max
Grid slow speed 30 % of max
<ESC> to exit, <TAB> move to next entry field
1 Help 2 Save 3 4 5 6 7 8 9 10 Quit

AEC Correction tables

This section will guide you through the following steps:

- Installation of correction tables (F2).
- Calibration of correction tables (F3), including rough setting of sensitivity correction.

The AEC uses one (1) correction table for each Anode/Filter/Speed combination. Each correction table has separate corrections for each object table group (Magnification, Grid and No grid).

Installation of AEC correction tables

- Start the **Service Program** application on the service PC .
- In **Mainmenu** select **Configuration > AEC > AEC correction tables**. The dashes in the ID column show that no correction table is installed Fig. 1, Page 4 - 9.

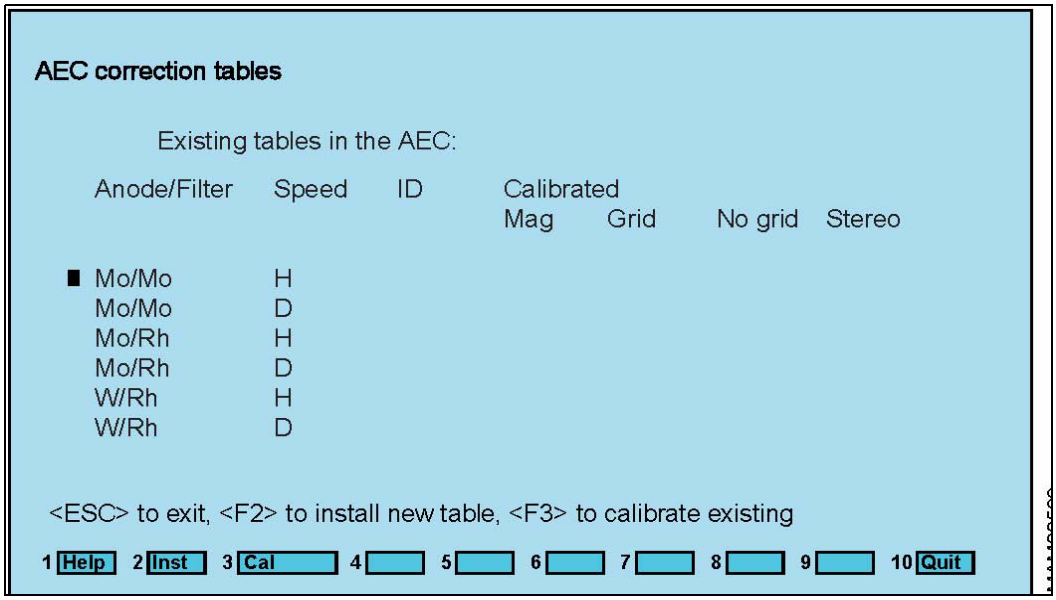
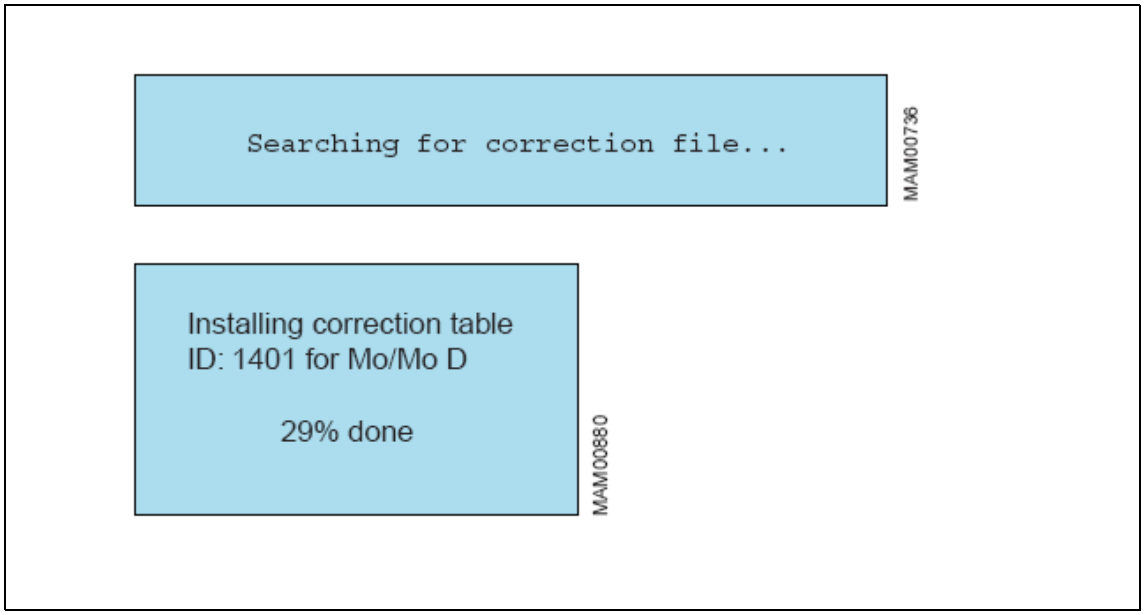


Fig. 1 AEC correction tables

NOTE	**Install the correction tables on D only!**

- Make sure that the ***new backup floppy*** is inserted.
- Decide for which combination you need to install the correction table. (For available identifications of correction tables see Table 1, Page 4 - 1, or the new backup floppy.)
- Place the cursor by one of the desired Anode/Filter/Speed combinations. Press F2.

- Type the ID number of the new correction table (see Table 1, Page 4 - 1) in the dialog which appears. Press **F2** to install the table. A message box will appear before the correction file has been found.



- When the transfer of tables is finished, a dialog like on the Fig. 2, Page 4 - 12, will appear. To complete the calibration, proceed from step 5 of that section.

NOTICE

In order to resume calibrating after having quit the program:

Follow the instructions from step 1 under "Calibrate correction tables" 4, Page 4 - 11.

Calibrate correction tables

NOTE	**The new backup floppy must be inserted.**

The Anode/Filter/Speed combinations should be calibrated one at a time.

1. In **Mainmenu** select **Configuration > AEC > AEC correction tables**. (The table ID actually equals 15xx! The ID numbers shown may be examples only !).

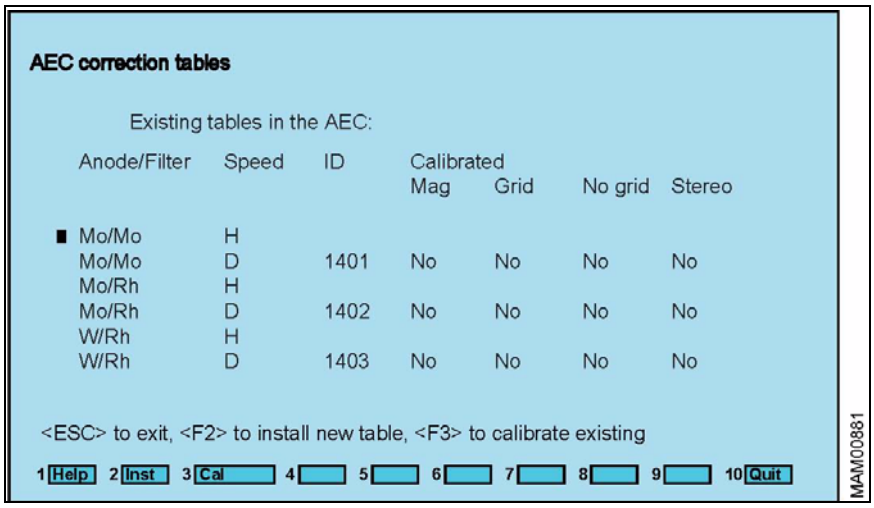
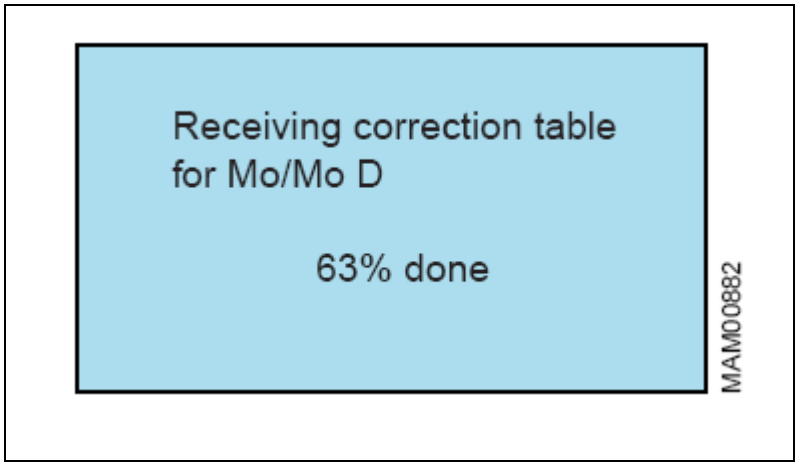

AEC correction tables
Existing tables in the AEC:
Anode/Filter Speed ID Calibrated Mag Grid No grid Stereo
Mo/Mo H
Mo/Mo D 1401 No No No No
Mo/Rh H
Mo/Rh D 1402 No No No No
W/Rh H
W/Rh D 1403 No No No No
<ESC> to exit, <F2> to install new table, <F3> to calibrate existing
1 Help 2 Inst 3 Cal 4 5 6 7 8 9 10 Quit
MAM00881

Fig. 2

NOTICE	**All object table groups and Anode/ Filter combinations available at the site must be calibrated prior to release for clinical use.**

Place the marker by one of the desired Anode/Filter/Speed combinations. Press F3 to transfer the table.

2. This message box is displayed while the service program receives the correction table.



3. When the transfer is done, the dialog *Calibration AEC correction table* appears.

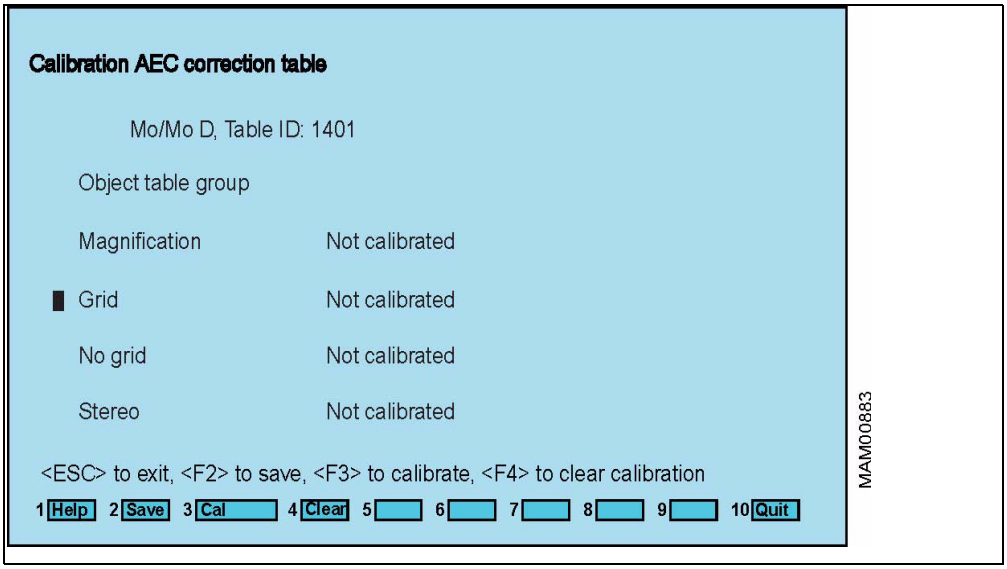
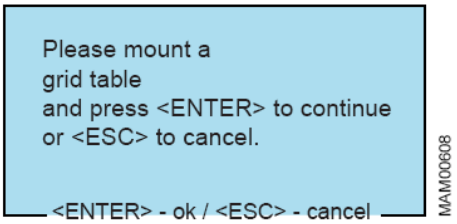

Calibration AEC correction table
Mo/Mo D, Table ID: 1401
Object table group
Magnification Not calibrated
Grid Not calibrated
No grid Not calibrated
Stereo Not calibrated
<ESC> to exit, <F2> to save, <F3> to calibrate, <F4> to clear calibration
1 Help 2 Save 3 Cal 4 Clear 5 6 7 8 9 10 Quit
MAM00883

Fig. 3 Dialog *Calibration AEC correction table* shows which object tables, in the current Anode/Filter/Speed combination, have been calibrated.

4. To calibrate the correction table for an object table group, place the cursor in front of the group. Press **F3**.



5. Follow the instructions in the message box above and press **Enter**.

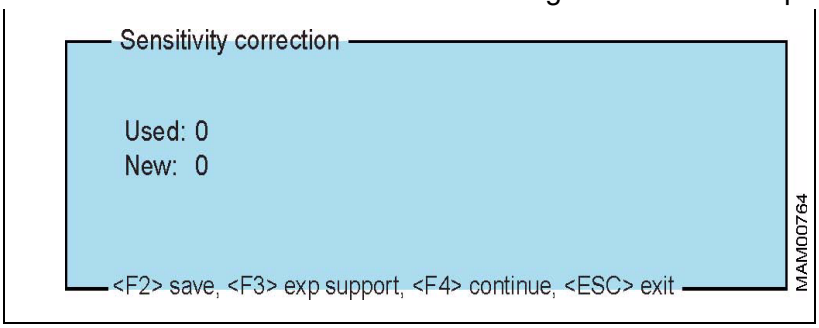


Fig. 4 Dialog *Sensitivity correction*

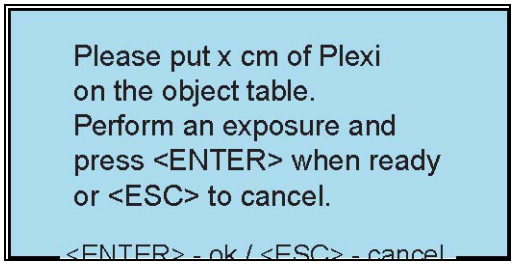
6. Before calibrating the installed correction tables, it is necessary to make a rough setting of the sensitivity correction for the chosen object table group.

7. Insert the reference IP cassette in the object table.

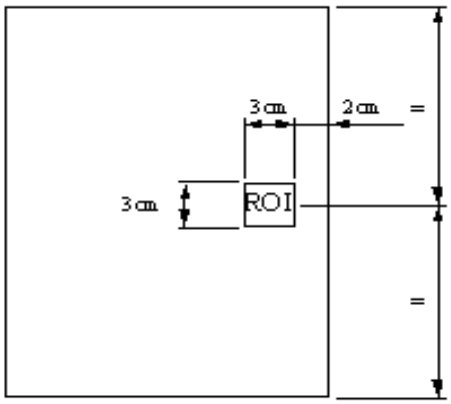
NOTE	**Make sure the new backup floppy is inserted.**

NOTE	**Do not use a compression plate.**

8. Press **F3**.



9. Follow the instructions in the message box in the service program, press **Enter** and perform an examination according to "**Examination**" on 3, Page 3 - 1.
10. Look for the PV (Average pixel value for the area of interest) according to figure below. See also Fig. 3 on the Page 3 - 2.



11. If the value differs from 1040, switch to the service program, adjust the values in dialog *AEC - Sensitivity correction* (Fig. 4, Page 4 - 12).
12. Save the new Sensitivity correction value with **F2**. Repeat the procedures described from step 8 to step 13 until the value is as close as possible to 1040. If the value is satisfactory, proceed by pressing **F4**.

NOTE	**One adjustment step of sensitivity correction (1/8 E.P.) corresponds to approximately 20 PV.**

NOTE	**It is important to use 1040 and the specified AEC calibration plexi (material No. 65 61 224 and 65 61 232) during the procedures under “Calibrate correction tables”, since measurements are relative to factory results at 1040. The PV preferred by the customer can be adjusted later either in Sensitivity correction or Sensitivity.**

13. Take another IP cassette than the reference IP cassette. Since it will not be developed, the IP cassette can be used for all exposures during the following calibration.

NOTE	**Erase the used IP cassette after the exposures.**

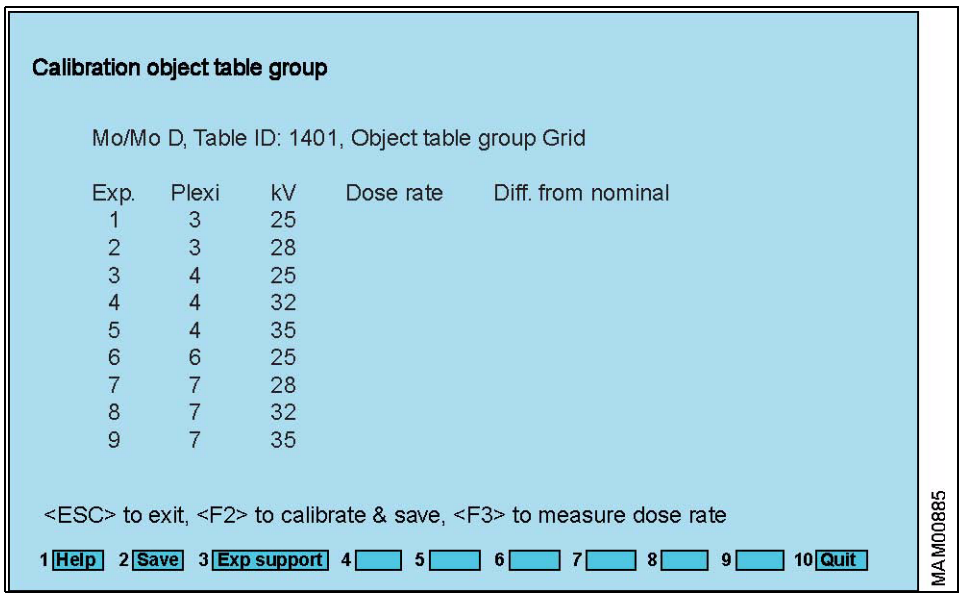
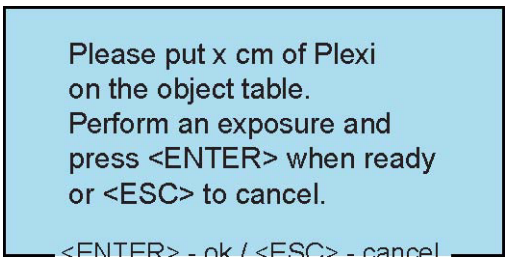

Calibration object table group
Mo/Mo D, Table ID: 1401, Object table group Grid
Exp. Plexi kV Dose rate Diff. from nominal
1 3 25
2 3 28
3 4 25
4 4 32
5 4 35
6 6 25
7 7 28
8 7 32
9 7 35
<ESC> to exit, <F2> to calibrate & save, <F3> to measure dose rate
1 Help 2 Save 3 Exp support 4 5 6 7 8 9 10 Quit
MAM00885

Fig. 5 Dialog *Callibration object table group* shows the dose rates for a number of exposures. The dashedlines below the dose rate indicate that no exposures have been performed yet.

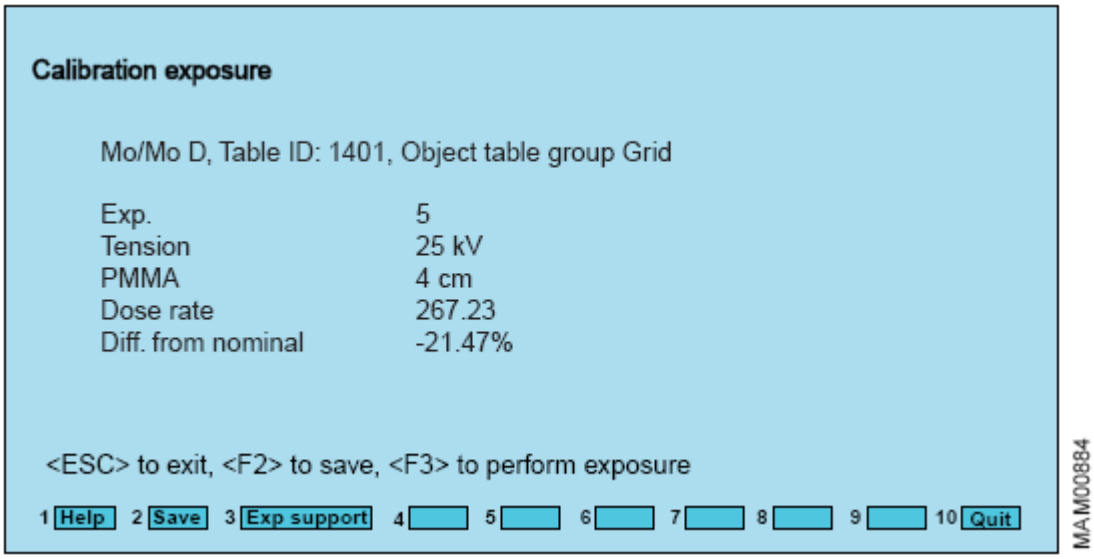
14. To proceed with the calibration, place the cursor by one of the alternatives. Press **F3**.



15. Follow the instructions in the message box shown.

NOTE	**Do not use 2 x 1 cm plexi plates instead of a 2 cm plate.**

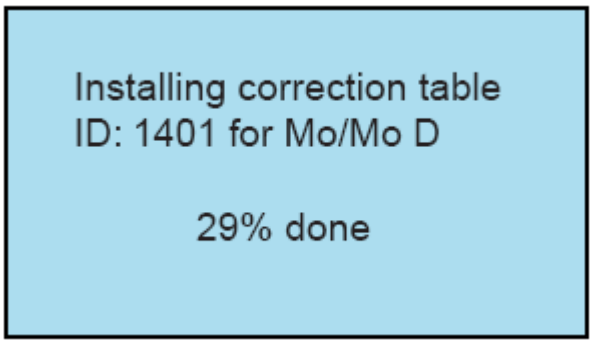
16. When the exposure is done, the dialog *Calibration exposure* appears with values for Dose rate and Difference from nominal.


Calibration exposure
Mo/Mo D, Table ID: 1401, Object table group Grid
Exp. 5
Tension 25 kV
PMMA 4 cm
Dose rate 267.23
Diff. from nominal -21.47%
<ESC> to exit, <F2> to save, <F3> to perform exposure
1 Help 2 Save 3 Exp support 4 5 6 7 8 9 10 Quit
MAM00884

NOTE	**If the Diff. from nominal exceeds ± 50%, reasure yourself that the exposure really has taken place, the thickness of AEC calibration plexi (material No. 65 61 224 and 65 61 232) is correct, the plexi is properly positioned and that the cassette (loaded with IP) is inserted. Repeat the last exposure. If the difference still exceeds ± 50% , accept the value and proceed further.**

17. Save the values with **F2.**
18. Repeat steps 15 to 18 until all exposures are done.

19. Perform erasure of the IP cassette according to Page 3 - 3.
20. When all exposures for one object table group are done, save the values with **F2** in the dialog *Calibration object table group*.
21. The dialog *Calibration AEC correction table* appears. Select the next object table group and repeat steps 5 to 22.
22. When all desired object table groups are calibrated, press **F2** to install the calibrated correction table in the AEC.



23. The dialog *AEC correction tables* appears. Repeat from step 2 until all available Anode/ Filter combinations are calibrated.

Recalibration of an object table

An already calibrated object table group can be re-calibrated.

NOTE	**Make sure the new backup floppy is inserted.**

1. Repeat the procedure described in steps 1 to 4, Page 4 - 11.
2. To recalibrate a correction table for an object table group, place the cursor in front of the group. Press **F4**. This will reset the existing calibration of the chosen object table group and replace it with the original correction table stored on the floppy.
3. Press **F2** to save.
4. Recalibrate the desired object table group according to the normal procedure, from step 2, Page 4 - 11.

Sensitivity correction (fine setting)

NOTE	**New backup floppy must be inserted. The specified AEC calibration plexi (material No. 65 61 224 and 65 61 232) must be used.**

When all desired object table groups are calibrated, a fine setting of the sensitivity correction should be performed for all available object tables.

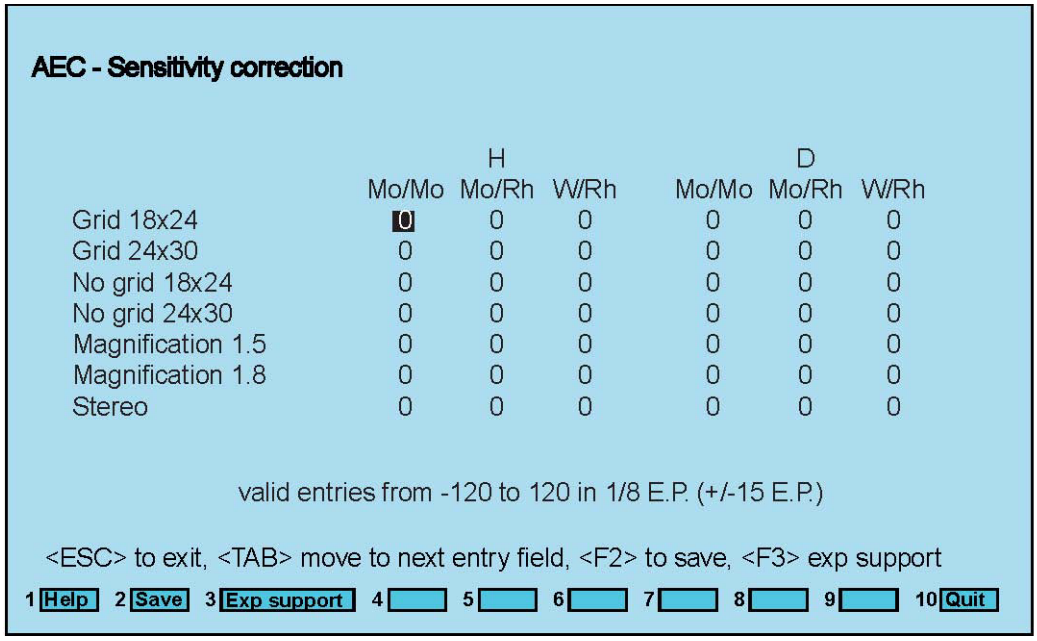

AEC - Sensitivity correction
H
D
Mo/Mo Mo/Rh W/Rh Mo/Mo Mo/Rh W/Rh
Grid 18x24 0 0 0 0 0 0 0
Grid 24x30 0 0 0 0 0 0 0
No grid 18x24 0 0 0 0 0 0 0
No grid 24x30 0 0 0 0 0 0 0
Magnification 1.5 0 0 0 0 0 0 0
Magnification 1.8 0 0 0 0 0 0 0
Stereo 0 0 0 0 0 0 0
valid entries from -120 to 120 in 1/8 E.P. (+/-15 E.P.)
<ESC> to exit, <TAB> move to next entry field, <F2> to save, <F3> exp support
1 Help 2 Save 3 Exp support 4 5 6 7 8 9 10 Quit

Fig. 6 Set the sensitivity for all desired object tables.

1. In **Mainmenu** select **Configuration > AEC > Sensitivity correction**.
2. Install an object table.
3. Insert the reference IP cassette in the object table.
4. Perform an examination according to paragraph "Examination" on Page 3 - 1.

NOTE	**From this point onrward a compression plate may be used.**

5. Look for the PV (Average pixel value for the Region of interest).
6. If the value differs from 1040 (factory recommended value) or from the customer preferred value, switch to the service program, adjust the values in the dialog *AEC-Sensitivity correction* Fig 4 on the Page 4 - 12.
7. The PV should be as close to 1040 (or by the customer-preferred value) as possible. One adjustment step of sensitivity correction (1/8 E.P.) corresponds to approximately 20 PV points. If the PV is more than 20 from the preferred value, switch to the service program and adjust the values in dialog AEC

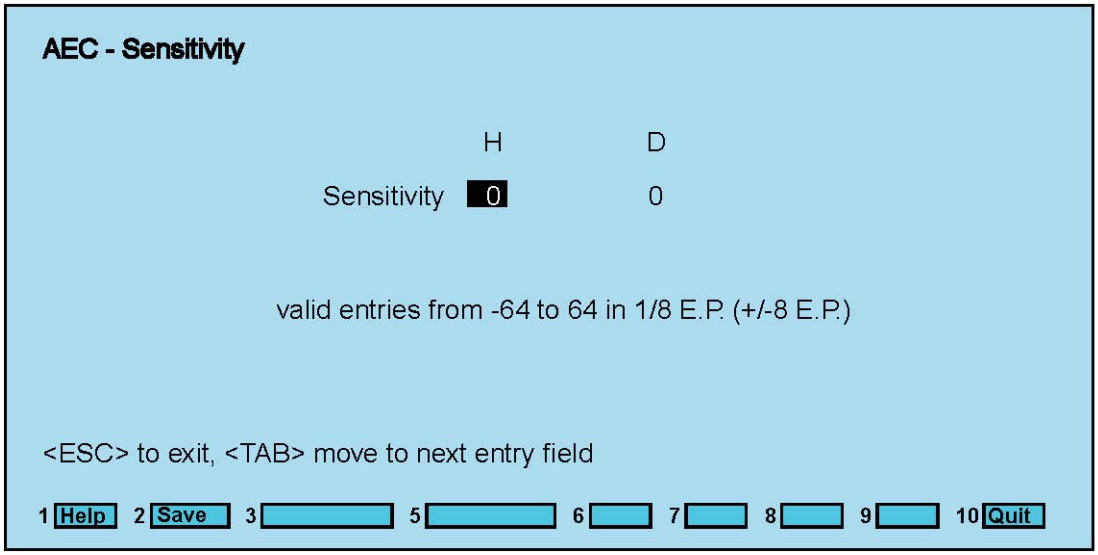
- *Sensitivity correction* Fig. 6, Page 4 - 18. Save with **F2**. Repeat the procedure described in steps 3 to 5.

NOTE	**One adjustment step of sensitivity correction (1/8 E.P.) corresponds to approximately 20 PV.**

8. Repeat this procedure for the other object tables, if applicable.

Sensitivity

Adjustment of AD Value for the whole AEC is performed under **Mainmenu > Configuration > AEC > Sensitivity**.



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NOTE	**The PV preferred by the customer can be set with this function. The customer's own phantom(s) can also be used.**

Testing the AEC-function

AEC performance test

Testing of the AEC-function has to be performed according to the test protocol on Page 6-2, and for the object tables in question. (Should error codes Er013 or Er450 appear; change to AEC calibration plexi (material No. 65 61 224 and 65 61 232) which is 1 cm thinner.)

NOTE	**Tolerance only valid for Image Plate / cassette combinations listed in Table 1 under "General" on 4, Page 4 - 1.**

Image detector dose

1. Position 3-5 cm plexi on the grid object table. Be careful to position the plexi so that it is overlapping the chest wall edge with approximately 1 cm, in order for the AEC to operate in a correct way.
2. Insert the reference IP casette in the grid object table.
3. Make an AEC exposure with 28 kV and Mo/Mo. Select the AEC D button to use the AEC mode.
4. Record the indicated mAs value in the test protocol.
5. Remove the reference IP cassette.
6. Position the ionization chamber inside the cassette compartment above the AEC detector.
7. Manually select (on the control panel of MAMMOMAT 1000/3000 Nova) the mAs value that is closest to the measured AEC mAs value and use it during the following measurements (with AEC mode disabled).
8. Make an exposure with 28 kV and Mo/Mo.
9. Read the dose from the ionization chamber and record the value in the test protocol. The image detector dose shall not exceed 100 µGy (10 mrad), the recommended dose is 70 µGy.

Reinstall/Install program parameters for OPDOSE

NOTE	**If OPDOSE shall be used for the IP cassettes, the following steps must be done.**

1. If the system is ON and the service program is running, go to step 4, else go to step 2.
2. System ON.
3. Start up the service program.
4. In **Mainmenu** select **Configuration > Miscellaneous > Panel programming**. The panel program switch must be ON. Save with F2.
5. In **Mainmenu** select **Configuration > Miscellaneous > Auto limits**. Make sure the values are in Program 1 => 30 mm, in Program 2 => 45 mm and in Program 3 => 60 mm, or the values desired by the customer. Change if needed and then save with **F2**.
6. Set kV (1/Fig. 7, Page 4 - 22), density (2/Fig. 7, Page 4 - 22), H/D (3/Fig. 7, Page 4 - 22) and anode/filter combination (4/Fig. 7, Page 4 - 22), for one of the programs according to the test values previously noted in the protocol, except density correction which should be set to zero (0).
7. Save the program parameters if needed by pressing the store button (6/Fig. 7, Page 4 - 22) and then the program button (5/Fig. 7, Page 4 - 22). Keep both buttons pressed until the program button stops flashing (approximately 5 s). Repeat the procedure in step 5 to 6 for the remaining programs.

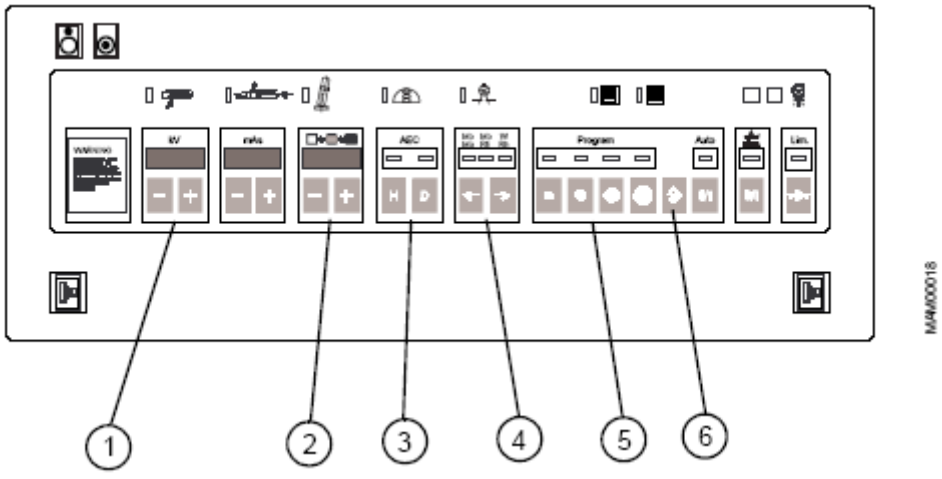


Fig. 7

Factory settings

Changes can be made with the service program (Configuration, Miscellaneous, Auto limits).

Thickness	kV	Anode/filter combination
≥ 61 mm	26	W / Rh
46 - 60 mm	27	Mo / Rh
31 - 45 mm	27	Mo / Mo
0 - 30 mm	26	Mo / Mo

Fig. 7 Installations with filter disc Mo 0.030 / Rh 0.025 / Rh 0.050

Thickness	kV	Anode/filter combination
≥ 61 mm	28	Mo / Rh
46 - 60 mm	27	Mo / Rh
31 - 45 mm	27	Mo / Mo
0 - 30 mm	26	Mo / Mo

Fig. 8 Installations with filter disc Mo 0.030 / Rh 0.025

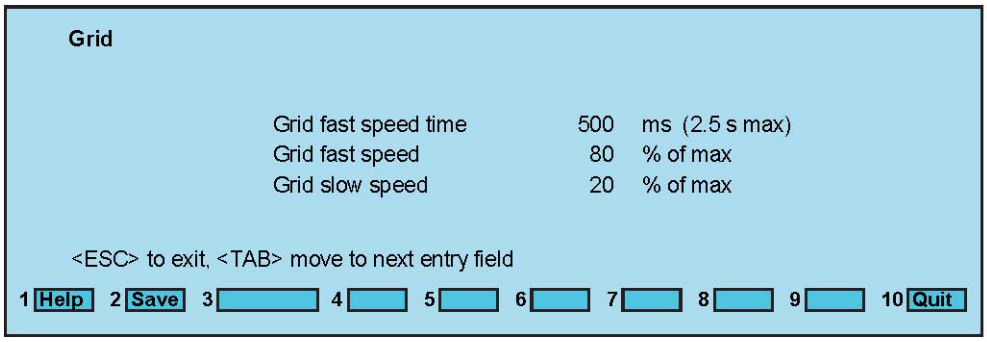
Testing OPDOSE

1. Mount an 18x24 cm compression plate to the MAMMOMAT 3000.
2. Select a thickness of AEC calibration plexi (material No. 65 61 224 and 65 61 232), that is within the thickness interval of the program to be tested. The thickness intervals can be found in **Mainmenu > Configuration > Miscellaneous > Auto limits**. For more information about Auto limits, see Chapter “Miscellaneous -> Auto limits” in the service manual “Service Program” for MAMMOMAT 3000.
3. Select AUTO on control panel.
4. Place the AEC calibration plexi on the object table in question and compress to 6 kg or more.
5. Check that the correct program is blinking on the control panel. Select the program by pressing the corresponding program button on the control panel.

6. Perform an examination according to "Examination" on 3, Page 3 - 1.
7. Look for the PV (Average pixel value for the area of interest).
8. The PV shall be as close 1040 as possible (or the density preferred by customer). If necessary adjust density correction on control panel. Save by pressing the store button and then the program button. Keep both buttons pressed until the program button stops flashing.
9. Repeat the procedure described in steps 2 to 8 for the other used programs.
10. Note the OPDOSE settings in the attached test protocol.

Final procedures

- If the service program is running, go to the seventh point (step "DLF" switch), else continue with the start of the service PC here:
- Start service PC.
- Log in (make sure you have administrator rights).
- Press **Start** and select **Programs > Accessories > Command Prompt**.
- Type “CD mammomat” and press **Enter**. Make sure that the new backup floppy is inserted. Type “A:” and press **Enter**.
- Start the service program by writing: Service, then press **Enter**.
- Activate the DLF switch. In **Main menu** select **Configuration > Miscellaneous > DLF switch**, press space to set switch to ON. Press **F2** to save.
- In **Mainmenu** select **Configuration > Miscellaneous > Cassette loaded check**. Set to ON.
- Reduce the grid speed. In Main menu select **Configuration > Grid speed**. Set the following values. Press **F2** to save.


Grid
Grid fast speed time 500 ms (2.5 s max)
Grid fast speed 80 % of max
Grid slow speed 20 % of max
<ESC> to exit, <TAB> move to next entry field
1 Help 2 Save 3 4 5 6 7 8 9 10 Quit
MAM00762

- In **Main menu** select **Service > Copy error buffer to file**.
- Take the backup to hard disk: **Backup > Copy installation area to disk > All**.
- Make sure the ***new backup floppy*** is inserted, marked with serial number of system and version of the correction tables (can be found on the AEC floppy disk with material No. 66 01 897).
- In **Mainmenu** select **Configuration > Save config file**. Press F2 to save.
- In **Mainmenu** select **Service > Delete error buffer**. Press y to delete.
- Quit the service program by pressing F10.
- Type “C:” and press Enter.
- Type “COPY *.TXT A:” and press Enter.
- Check that the following backup files are stored on the floppy disk (by typing “dir a:”, then pressing Enter):
  - a_backup.txt for AEC parameters
  - s_backup.txt for stand parameters
  - p_backup.txt for panel parameters
  - momo_h.txt for AEC correction tables
  - morh_h.txt for AEC correction tables
  - wrh_h.txt for AEC correction tables
  - momo_d.txt for AEC correction tables
  - morh_d.txt for AEC correction tables
  - wrh_d.txt for AEC correction tables
  - mammo.cfg for configuration parameters
  - errorbuf.txt for error log
- Type “DEL *.TXT”.
- Type “CD..”.
- Type “RMDIR mammomat”.
- Mains voltage and system OFF.

NOTE	**Keep all floppy disks in a suitable place in the system folder, with other documentation for the MAMMOMAT in question.**

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- Remove the service PC.
- Attach the enclosed labels on the MAMMOMAT label plate according to Fig. 1, Page 5 - 1.

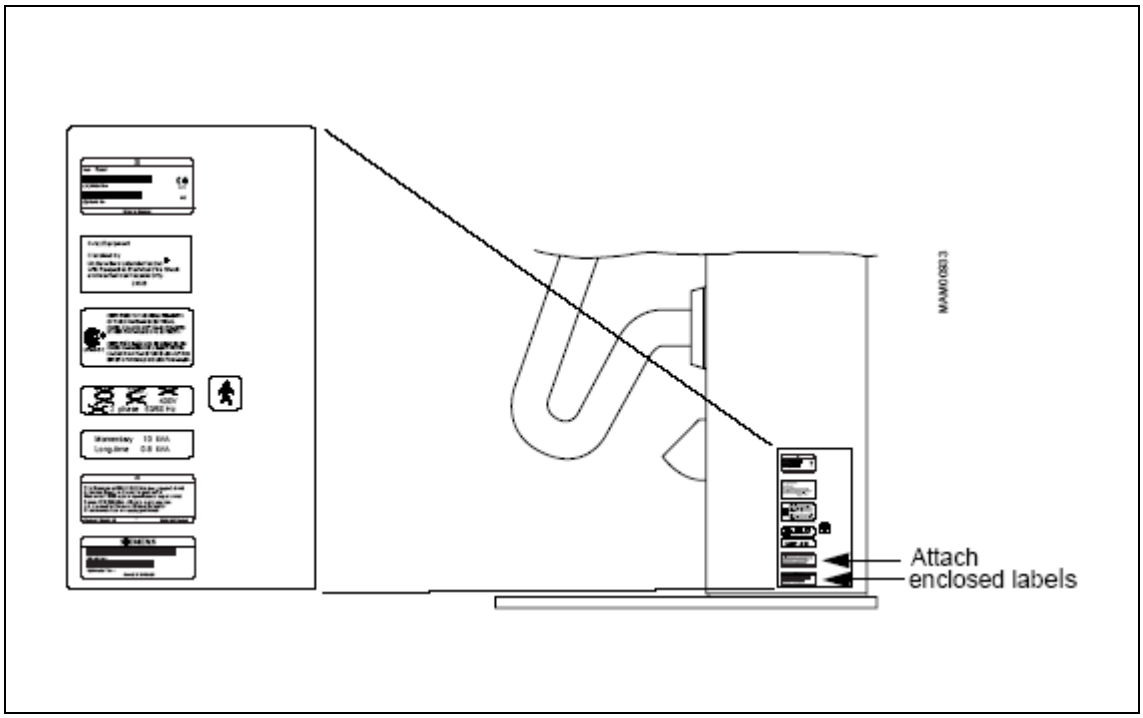

Fig. 1 Attach labels

- Fill in the IVK list or report the IVK components to your responsible uptime service center (USC).

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MAMMOMAT Serial number .....

AGFA CR 75.0 Digitizer Serial number .....

Name of installer .....

Installation date .....

Backup of existing system

Use these two protocols with the instructions in "Preparation of backup floppy" on 4, Page 4 - 4 and onward.

Anode	Power (kW)
Large focus Mo	
Large focus W	
Small focus Mo	
Small focus W	

The customer's own OPDOSE settings:

Program buttons	kV	Density correction	Speed button H	anode/filter combination	Breast thickness

AEC performance test

To be performed for the object tables, wings, and speeds in question.

*Should error codes Er013 or Er450 appear; change to AEC calibration plexi which is 1 cm thinner.

	IP		Cassette	
	Manufacturer	Type	Manufacturer	Type
D	AGFA	CR Embrace	AGFA	CR Embrace

Wing 1 M3000, Wing 2 M1000

For applicable anode/filter combinations.

Grid Table 18x24 (Bucky)		mAs	PV
Mo/Mo	25 kV, 6 cm Plexi*		
Mo/Mo	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Grid Table 18x24 (Bucky)		mAs	PV
Mo/Rh	26 kV, 6 cm Plexi*		
Mo/Rh	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Grid Table 18x24 (Bucky)		mAs	PV
W/Rh	25 kV, 6 cm Plexi*		
W/Rh	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Magnification Table		mAs	PV
Mo/Mo	25 kV, 6 cm Plexi*		
Mo/Mo	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Magnification Table		mAs	PV
Mo/Rh	26 kV, 6 cm Plexi*		
Mo/Rh	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Magnification Table		mAs	PV
W/Rh	25 kV, 6 cm Plexi*		
W/Rh	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Wing 2 M3000

Magnification Table		mAs	PV
Mo/Mo	25 kV, 6 cm Plexi*		
Mo/Mo	32 kV, 2 cm Plexi		

Tolerances: 1040 ± 52 (factory recommended value) or customer preferred value ± 52

Image detector dose

Cassette No.: IP No.:		
IP No.:		
mAs measured ("AEC mAs"):		mAs
Image detector dose:		µGy

The image detector dose shall not exceed 100 µGy, the recommended dose is 70 µGy.

OPDOSE settings

Use this protocol with the instructions in "Testing OPDOSE" on 4, Page 4 - 24.

Program buttons	kV	Density correction	anode/filter combination	Breast thickness	PV